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Eagle Point Solution to a Frequently Asked Question

How to Design an Auxiliary Spillway Layout

Summary:

This document explains the process of

- Placing the top, wave berm, and toes of the embankment.
- Placing a group of objects into CAD that represent the auxiliary spillway using the Spillway Layout tool.
- Projecting slopes from the spillway to the Original Ground surface.
- Trimming and cleanup.
- Create an embankment surface that includes the spillway.

Product: Eagle Point Software™ 2003

Release: 2003 Q1 or 3.1.0 and greater

Platform: All

Related documents: *How to Design an Embankment with a Berm*

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Notation Method

Button to Press	<i>Displayed Text</i>	Icon	<u>Action</u>	{Text to Enter}	<u>Menu Item</u> ...
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Placing the Embankment Top and Toes

Follow the instructions in *How to Design and Embankment with a Berm* in the sections:

- Placing the Centerline and Top of Dam
- Placing the Toes and Pool Berm of the Dam

Placing the Spillway Layout

1. From AutoCAD, click *NRCS/EP... NRCS Dams...Auxiliary Spillway Layout...*
2. Input the dimensions, slopes, radius and auxiliary spillway elevation.

Auxiliary Spillway Layout

Aux Spillway

Length of Level Section, ft

Bottom Width, ft

Aux Spillway Elev, ft

Inlet Curve Radius, ft

Inlet Curve Slope, ft/ft

Outlet Length (straight), ft

Outlet Slope, ft/ft

Outlet Curve Radius, ft

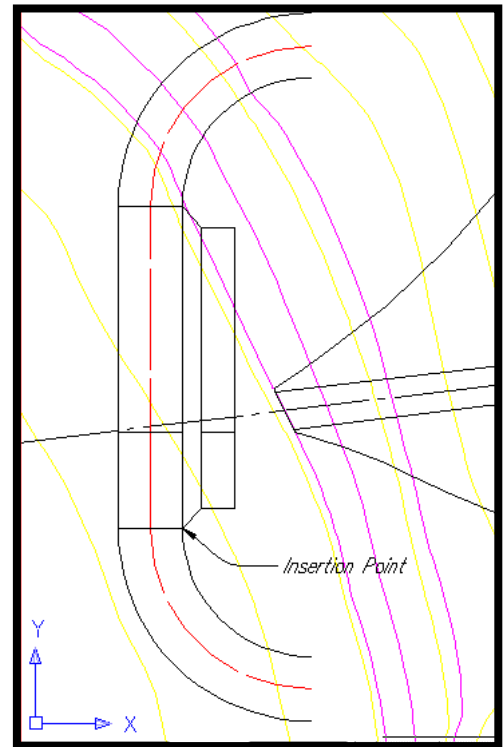
Outlet Curve Slope, ft/ft

Spillway Dike

Dike Top Width, Ft

Dike Height (above AS), Ft

Dike Side Slope H/V, Z:1



3. Click **Place into CAD**.
4. Select an insertion point in CAD for the upstream right corner of the spillway level section.
5. The spillway is set up for the left end of a dam. To mirror the spillway to the right end of the dam:
 - a) Select any line of the spillway layout and click the **Mirror icon**.
 - b) Click to locate the first point of a mirror line.
 - c) Click to locate the second point of a mirror line.
 - d) Press Y. Press Enter to remove the layout that fits the left end of a dam.
6. To move the spillway layout and maintain the same elevation:
 - a) Turn *Osnaps* off, select any line of the spillway, and click the **Move icon**.
 - b) Click any location as a reference point for moving the spillway.
 - c) Click the new location of the corner.
7. To rotate the spillway layout:
 - a) Select any line of the spillway. Click the **Rotate icon**.
 - b) Click to the pivot point.
 - c) Click to place the new rotation angle.

Note: If a second spillway layout graphic is going to be placed into CAD the selection group must be renamed as follows.

8. From AutoCAD, click *NRCS/EP... NRCS Storage Pond...Manage Object Groupings...*
9. Highlight *AuxSpill*.
10. Input a new Group Name using NO spaces. E.g. {AuxSpill_1}.
11. Click **Rename**.
12. Click **OK**.

Placing the Cut/Fill Slope Toes for the Spillway and Dike

1. From AutoCAD, click *NRCS/EP... NRCS Storage Pond...Select by Group-Toggle On/Off* to be able to select the lines individually.
2. Click AutoCAD's **Trim**.
3. Select the downstream edge of the dam as the cutting edge. Press Enter.
4. Type E {Edge}. Type N {No Extend}.
5. Click to trim the downhill edge of the spillway dike so that it does not extend upstream of the edge of top of dam. Press Enter.
6. From AutoCAD Click *NRCS/EP... Create Site Layout... Project Slopes to Surface Model...*
7. Pull down to the Original Ground surface model name. E.g. {Ognd}.
8. Input the proper fill slope as a negative number. E.g. {-3} as H/V.
9. Input the proper cut slope as a positive number. E.g. {3} as H/V.
10. Uncheckmark *Erase all Existing Slope Projections...*
11. Click Apply.
12. Select the downstream edge of the spillway dike.
13. Click on the downstream side of the selected line.
14. Select the outside edge of the spillway.
15. Click on the outside side of the selected line.
16. Press Enter.
17. Select the inside edge of the spillway inlet.
18. Click on the inner side of the selected line.
19. Select the inside edge of the spillway outlet curve.
20. Click on the inner side of the selected curve.
21. Press Enter. Click Close.
22. Set the current layer to *C.Plan.Embk*
23. Click **3D Polyline**.
24. With Osnaps on, draw a 3d polyline across the area where the inlet zeros out and where the outlet zeros out.
25. Click AutoCAD's **Trim**.
26. Trim the lines that show fill for the spillway inlet and outlet. Trim the lines from the embankment that should be 'covered up' by the spillway dike and excavation.
27. Select the slope projection lines and move them to the *C.Topo.Embk.Slop* layer.

Making the Outside Toes of the Layout into One Object

1. Click **3D Polyline**.
2. Draw in any extra lines need to enclose the boundary of the spillway/dike/embankment outline. (use Osnaps settings with endpoints).
3. From AutoCAD Click *NRCS/EP... Create Site Layout... 3D Join...*
4. Select the lines representing the toes of the spillway & embankment. Press Enter.
5. Select the toe to see if has all become one 3D Polyline. If not, ends grips may need to be re-snapped to ends of adjoining lines.
6. Make sure that the toes, the wave berm, the spillway, and the top of fill lines are on the *C.Plan.Embk* layer.

Preparing Surface Model settings for the Spillway & Embankment

1. From AutoCAD, click *NRCS/EP... Create Contours... Manage Surface Model...*
2. Click the **New Surface Model Icon**. This brings up New Surface Model box.
3. Click on the **Library icon** (looks like books on a shelf) and select the *Embankment* surface model. Click Load Prototype. Click Yes. Click Close.
4. Input a Description name. E.g. {Embk}, which would represent the embankment and spillway.
5. Once you have settings done click OK.
6. Click Close to close out of Manage Surface Models

Creating a Surface Model for the Spillway and Embankment

1. From AutoCAD, click *NRCS/EP... Create Contours... Triangulate Surface Model...*
2. Pull down the name for the Embankment. E.g. *Embk.*
3. Pull down to set boundary line to *Select*.
4. Place a checkmark by *Display Model* if you want to see a temporary set of triangulation. Click Apply.
5. Use AutoCAD selection methods to pick the objects to triangulate. Include the slope projection lines, the catchline toes, and the edges of the spillway bottom and top of dike and embankment. Once objects are selected press the Enter key.
6. The command line should now ask you to select boundary. Select boundary by clicking the toe of the dam with your mouse.
7. Click Close on the Triangulate Surface Model.
8. From AutoCAD, click *NRCS/EP... Create Contours... Triangulate Surface Model...*

Use *NRCS/EP... Create Contours... Track Coordinates...* to verify the correctness of the surface model. You can use this surface model compared to the *Ognd* to determine the earthfill or the spillway excavation.

Submitted by Norman Friedrich.